ATTACHMENT C

Initial Soil Survey Resamples Results

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Results

Soil samples were collected from 4 of the locations included in the initial soil survey of Vashon-Maury Island to provide additional samples with high contaminant concentrations for the tracer element study. At each of those four locations, 9 soil samples were collected by sampling at 0-2, 2-6, and 6-12 inch depth intervals in three borings. Only arsenic analyses were performed for these 36 samples; arsenic was considered to be a sufficient indicator for selection of samples to include in the tracer element study.

The four sampling locations included three on Maury Island (original locations 84, 100, and 101) and one on south Vashon Island, near Tahlequah (original location 65) (see PHSKC and Glass 2000). The same analytical protocols were used as for arsenic analyses in the child-use area samples. The results of arsenic analyses are shown in Table C-1. Resampling at these selected initial survey locations was successful in providing soil samples exceeding 200 ppm arsenic for inclusion in the tracer element study, thus extending the range of concentrations beyond those available from only the child-use area samples. (Tracer element analytical results are being reported separately).

Comparing the results for the soil resamples to the results at the same locations in the initial survey provides additional information on local variability in near-surface arsenic concentrations. These comparisons are made for results in the top 6 inches only, since only two depth intervals were sampled in the initial survey. The ranges for arsenic concentrations in the top 6 inches in the two data sets, and the number of samples included, are as follows:

Location	Initial Survey	Resamples
065	79-130 ppm (n=6)	97-210 ppm (n=6)
084	23-140 ppm (n=2)	49-230 ppm (n=6)
100	78-150 ppm (n=2)	15-180 ppm (n=6)
101	120-180 ppm (n=2)	43-160 ppm (n=6)

For three of the four resampled locations, the Maximum arsenic concentration in the resamples was greater than in the initial survey. This reflects both an increased number of samples analyzed in the resamples (locations 084, 100) and inherent variations in the near-surface soil arsenic levels (all locations). One of the three borings at location 100 has notably low arsenic concentrations (possibly reflecting natural disturbance of the soils). The results at all four locations confirm that even closely-spaced soil borings often exhibit variations of several hundred percent in maximum arsenic concentrations. Increasing the number of soil samples collected and analyzed typically expands the range in observed concentrations where the sample sizes are small - that is, a very small number of samples is unlikely to fully represent the true variability in local soil arsenic levels.

The results for resamples at 6-12 inches also provide additional information on arsenic depth profiles compared to the initial survey (see also the discussion in Attachment D for forest fringe samples collected to a depth of 22 inches). At all four resampled locations, the maximum arsenic concentration in the top 6 inches exceeds the maximum concentration at 6-12 inches. For three of the four locations, the maximum arsenic value below 6 inches is less than 30 percent of the maximum value within the top 6 inches, indicating a significant dropoff in arsenic mobility. At location 100, however, the maximum arsenic value of 120 ppm at 6-12 inches is fully 75 percent of the maximum value within the top 6 inches. The resamples were collected using a series of stainless steel core tubes of increasing lengths, advanced in sequence within the same boring using a sledgehammer. This sampling method could conceivably have resulted in some surface soils sloughing into the open borehole with the advancement of successive core tubes, affecting depth profile results to some degree. The control of such artifacts may be less than with hand-sampling techniques.

Vashon-Maury Island
Child-Use Areas Study
Public Health - Seattle & King County
2001

Table C-1

Soil Arsenic Results
Initial Soil Survey Resamples
(in ppm, DW)

ARSENIC

			Boring	**0-2"**	**Q1**	**Q2**	**2-6"**	**Q1**	**Q2**	**6-12"**	**Q1**	**Q2**	**12-18"**	**Q1**	**Q2**	**18-22"**	**Q1**	**Q2**
				Note:	Q1 shows data qualifiers (flags) by analytical lab													
					Q2 shows data qualifiers (flags) by data validators													
	Zone:	1																
	Site:	84																
	DU:	1																
			1	210			230			27								
			2	49			180			56								
			3	68			120			36								
	Zone:	1																
	Site:	101																
	DU:	1																
			1	120			98			46								
			2	69			160			120								
			3	43			44			37								
	Zone:	1																
	Site:	1065																
	DU:	1																
			1	97			120			17								
			2	110			100			6.5								
			3	190			210			62								
	Zone:	1																
	Site:	1100																
	DU:	1																
			1	180			46			33								
			2	20			15			46								
			3	160			120			11								